

these, and no statement is advanced without a reference to the authority supporting it.

WILLIAM H. BATTLE.

RECENT CONTRIBUTIONS TO PULMONARY SURGERY.

In some recent Russian papers the surgery of the lungs has been discussed. Dr. Zakharevitch, of Kharkov, has placed on record an account of a series of experiments with reference to the extirpation of this viscus¹, which are of much practical interest. In connection with this subject the case of pneumonotomy² under the care of Professor Opensovsky may also be considered.

In order to verify Glueck's and Hansschmid's statements as well as to elaborate a well-working plan for pneumonectomy in man, Dr. Zakharevitch has made 13 experiments on rabbits, 11 on dogs, and 9 on human cadavera. The following strictly aseptic and probably bloodless operation was performed in every one of the animals. Having made a subperiosteal resection of from 1 to 4 ribs, according to the size of the portion removed, he most cautiously dragged the latter out of the wound, tied its root with silk, cut away the part above the ligature, powdered the string with iodoform, returned it into the thoracic cavity, stitched the thoracic wound most hermetically, and applied a Listerian dressing. As a rule, the experiment was followed by a *post mortem* examination, the surviving animals being killed at varying intervals after the operation. The following points of considerable practical interest deserve to be placed before our readers.

A. Results of the operation: 1. Of 13 operations in 9 rabbits, only 2 proved fatal, death following immediately after opening the thoracic cavity. In one of the two, the whole lower lobe of the opposite lung was found to be infiltrated with tubercle. The other case refers to a rabbit in which the extirpation of the left upper lobe had been successfully performed a month before the second operation on the

¹An Experimental Contribution to Pulmonary Surgery. By Dr. V. M. ZAKHAREVITCH (Kharkov, Russia). *Transactions of the Kharkov Medical Society for 1887*, vol. ii.

²Pneumonotomy for Pulmonary Abscess and Gangrene. By Professor F. M. OPENSOVSKY (Dorpat, Russia). *Vratch*, No. 38, 1888.

right side. 2. Of 11 operations in 7 dogs, 3 were followed by death which in one case ensued from supervening suppurative pleurisy on the tenth day, while in the other two it took place instantly after opening the chest on a second operation, undertaken 2 months after a (completely successful) first extirpation. One of the dogs survived *four* years after two operations, always enjoying excellent health; it died from an entirely accidental cause.

B. Physiological Changes setting in after Pneumonectomy. 1. *Respiration* becomes invariably affected, and that the more so the larger the portion of the lung which has been removed. In some animals, breathing quickens and deepens, in some it becomes retarded and then deepens in a very striking degree. In either case, the alteration proves to be permanent or, at all events, remains for a very prolonged period after the operation, the phenomenon being especially pronounced after much exercise with fatigue. 2. Just after the operation, *pulse* quickens, and that sometimes very considerably (50 or 60 beats per 1'); simultaneously it becomes intermittent, the interruption being synchronic with the respiratory acme. 3. *Temperature* (rectal), as a rule, slightly rises just after the operation to return to the standard about the fifth day, and subsequently becomes permanently subnormal (from 0.3° to 0.7° C. lower comparatively with the animal's 1° before the operation). 4. *The body's weight* falls immediately after the operation to regain its normal condition in from 10 to 15 days in rabbits, and in from 20 to 30 in dogs. 5. As regards the *intra-thoracic pressure* the hermetical closure of the thoracic wound is a matter of the greatest importance. When the cavity remains open or when the sutures applied give way, an alarming dyspnoea sets in, the animal losing its ground rapidly and steadily. A hermetical closure of the wound under such circumstances relieves the condition as if by magic.

C. Anatomical Changes. 1. After the extirpation of the lung, the chest manifests an uncontrollable tendency to contraction. The ribs adjacent to those excised usually approximate themselves to a closer contact. 2. The pleura shows sometimes traces of a localized inflammation which may assume now and then even a suppurative character. 3. The ligatured portion of the pulmonary root, as a rule

does not undergo necrosis, but continues to live. Sometimes, however, it sloughs away and then, on the necropsy, may be found lying free in the pleural cavity. "The remaining portion of the lung operated upon proves to be always considerably enlarged." In some cases, its surface is found to be studded with numerous punctiform ecchymoses. 4. The liver and especially the heart are nearly always found to be similarly enlarged. 5. In some cases the mediastinal as well as the retro-peritoneal lymphatic glands also may undergo an enlargement which is dependent either upon a simple hyperplasia of the glandular tissue, or upon caseous degeneration.

D. Experiments on Human Cadavera were undertaken by the author in order to elucidate the questions, *a.* which ribs should be excised in man for removing this or that lobe of the lung, and *b.* where a counter aperture should be established for best serving drainage. The answers are these. 1. Since the root of the upper and middle lobes corresponds to the 3d intercostal space, and that of the lower one to the fourth, it is necessary to excise, in case of extirpation of the upper two lobes, the 2d rib; and in that of the lower lobe the 3d one. 2. The best drainage can be secured by establishing a counter opening in the eighth interstice, along the scapular or posterior axillary line.

E. General Corollaries. 1. Dogs and rabbits endure pneumonectomy relatively very well, "the animals often presenting a strikingly cheerful appearance even on the next day after the operation." 2. "A minimal respiratory area compatible with life and health amounts to two pulmonary lobes." In other words, an animal possessing two healthy lobes on one side of its chest, may be subjected to a total pneumonectomy on the opposite one, with good chances not only for the animal's recovery from the operation, but also for a long after-life." But "if only one lobe is in a healthy condition on either side of the chest, neither of the lungs can be operated upon," since opening the thoracic cavity on one side is followed by primary collapse of the corresponding lung. 3. Taking all in all, "both experiments on animals, and already published cases of surgical treatment of pulmonary cavities in man completely justify a more active operative interference in various regions of the pulmonary tissue." Hence, Dr. Zakhare-

vitch emphatically appeals to the profession to proceed with elaborating detailed indications for, as well as practising, pneumonectomy.

In Opensovsky's case of *pneumonotomy*, a well made and previously always healthy male peasant, æt. 30, was admitted 4 months after having caught pleuro-pneumonia. The patient had remained bed-ridden at the time only for a week. Two weeks later, when taking a steam bath, he had been suddenly seized with violent cough, during which he had expectorated a tumblerful of offensive pus. Ever since he had been suffering from agonizing cough with fetid sputa, fever and steadily increasing prostration and emaciation. On admission, a right-sided pulmonary abscess was diagnosed though repeated exploratory tapings gave invariably negative results. About three weeks after admission, all signs of a rapidly increasing gangrene around the abscess supervened, the patient's general state growing daily from bad to worse. As the only means of saving his life pneumonotomy was proposed and performed by Professors W. Koch and Opensovsky about the tenth day of the complication. The area of loudest tympanic tone and amphoric murmurs occupied the space between the fifth and seventh ribs vertically, and between the mammillary and posterior axillary lines horizontally, and measured transversely about 12 cm. Accordingly, Dr. Koch performed resection of the fifth and sixth ribs, removing from each a portion 10 cm. long. The pleuræ proving to be adherent, the operator plunged a thermo-cautery into the lung, striking a cavity at the depth of 2 or 3 cm. The patient (who had been anaesthetized but very slightly) began to cough, a pus jet jerking out on every succussion. On placing him on his right side, a tumblerful more of highly offensive green pus welled out from the (freely enlarged) wound. Having introduced his whole hand into the cavity, the writer at once found a necrotic focus on its inner aspect, and above the focus a large bronchus communicating with the abscess. The necrotized pulmonary tissue could be easily removed with fingers, without any loss of blood. The remaining surface of the cavity proved to be lined with a pyogenic membrane. The bronchial orifice was enlarged and the necrotic area as well as the external wound cauterized with the thermo-cautery, after which the cavity was washed out with a weak solution of

permanganate of potassium, a drainage tube inserted, and an antiseptic dressing applied. The irrigations, which caused some cough on each occasion, were repeated for 10 days twice daily, but later only once a day. On the seventh day the temperature became normal; on the thirty-eighth the drainage could be removed, the cavity having been almost completely obliterated. Shortly afterwards the wound was found soundly healed. On the eighty-first day, the man left, quite well, in which state he has remained ever since. On examination 1½ years after the operation the "region between the mamillary and posterior axillary lines was found to have the appearance of a shallow funnel with a scar at the deepest point," the respiratory excursions being diminished comparatively with the opposite side, the respiratory sounds rather weakened, but quite distinct everywhere. The vertebral column was somewhat scoliosed, the concavity looking toward the right. Analyzing his remarkable case, the author dwells mainly on the following points: 1. Pneumonotomy sometimes represents the only means for saving life in cases of pulmonary abscess. 2. The operation is borne quite well. 3. It should be undertaken as early as possible, that is, as soon as a pulmonary abscess has been diagnosed. 4. It is advisable to excise fairly long pieces of ribs and to make a free incision into the cavity, in order to secure both a thorough removal of its contents and a thorough disinfection of the parts. Moreover, free resection and incision promote a speedy and satisfactory obliteration of the cavity. 5. A thorough disinfection of pulmonary cavities seems to be endured without any untoward accidents. 6. Firm pleural adhesions constitute an important requisite for a successful issue of the operation, since they prevent suppurative pleurisy and make easier both the discovery of cavities and the removal of their contents. 7. Literature contains at present 18 cases of pneumotomy for pulmonary abscess, 9 of which recovered. In 6 of the 9 a complete recovery ensued (Teale, Rohden, Quincke, Runeberg, Blunt [*ANNALS OF SURGERY*, vol. viii, p. 311] Opensovsky), while in 3 a fistula remained (Quincke, Bacchius, Finne). The cases may be divided into three categories: *a*, those of pneumotomy in the strictest sense where no communication with the pleural cavity existed (Sutton, Teale, Rohden,

Quincke, Herrlich, Brookhouse, Rochelt, Blunt, Opensovsky); in all 16 with 6 recoveries; *b*, those where the communication was present (Radex, Payne, Bacchius, Finne, Runeberg); in all 5 with 3 recoveries; and *c*, those with a doubtful diagnosis (Sedgwick, Queiss, Waugh), in all 3 with 3 deaths.

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SKIN GRAFTING ACCORDING TO THIERSCH.¹

Reverdin's important discovery of skin grafting in 1870 soon found its application in hospital practice, but lately it has fallen into disuse on account of two faults, one an after contraction of the skin covered granulation surface, the other is a separation of the healed skin.

Thiersch states that the healing of a granulating surface depends on two factors, viz. : first in the changing of the soft succulent blood-carrying granulation papillæ into the bloodless dry cicatricial papillæ, a result which brings about a diminution of the surface and the drawing together of the neighboring parts. Second, a covering over of the contracted papillæ with epidermic cells. Both of these factors, the contraction of the wound and the growth of the pellicle take place together within certain limits, and when these limits are reached the granulating surface remains stationary.

If skin be placed on granulations which have not attained their maximum of contraction the process keeps up under the transplanted skin, and there results the drawing together of the part with all the evils of cicatricial contraction.

If, on the contrary, the skin be applied to a granulating surface which has reached its maximum of shrinking, a further contraction will not take place, but the succulent granulations remain under the healed skin, and the slightest mechanical irritation is sufficient to stir up hæmorrhages or exudations, this causing the falling off of the skin which has been placed over them.

If these theories be true then both bad results of skin grafting are

¹By E. PLESSING, (Leipzig) *Archiv. f. Klinische Chirurgie*, bd., 37, hft. 1.